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10/589,611

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EXAMINER

TRAN, TRANG Q

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/589,611 | Applicant(s) KAMEI, KOJI | |
| | Examiner TRANQ Q. TRAN | Art Unit 2811 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-16 is/are pending in the application.
- 4a) Of the above claim(s) 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on 3/11/2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, and 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onomura (6,067,309) in view of Takatani (JP 10-303504, as disclosed in the IDS).

Re. claim 1, Fig. 1 of Onomura discloses a gallium nitride compound semiconductor light-emitting device comprising:

a substrate (1+2), an n-type semiconductor layer (3+4) provided atop the substrate, a light-emitting layer (6) provide atop the n-type semiconductor layer, a p-type semiconductor layer (7+8+9) provide atop the light-emitting layer, a negative electrode (14) provided in contact with the n-type semiconductor layer (3+4), and a positive electrode (15+10+11a+11+12+13) provided in contact with the p-type semiconductor layer (7+8), the n-type semiconductor layer, the light-emitting layer and p-type semiconductor layer being composed of a gallium nitride compound semiconductor (as seen in Fig. 1), wherein

the positive electrode (15+10+11a+11+12+13) includes at least a contact metal layer (10) which is in contact with the p-type semiconductor layer (7+8),

the contact metal layer (10) comprises at least one metal selected from the group consisting of Pt, and

the surface portion of the p-type semiconductor layer (7+8) on the positive electrode side includes a positive-electrode-metal-containing layer (15) that contains at least one metal selected from the group consisting of Pt.

Onomura may not explicitly teaches the following limitations whereas Fig. 1 of Takatani teaches it is known in the art to provide wherein the surface portion of the contact metal layer (102+103) on the p-type semiconductor layer (101) side includes a semiconductor-metal-containing layer (102) that contains a Group III metal (PtGa₁).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the semiconductor-metal-containing layer of Takatani in Onomura in order to reduce contact resistance.

Re. claim 2, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Onomura further discloses wherein the positive-electrode-metal-containing layer (15) has a thickness, Onomura and Takatani may not explicitly teach the positive-electrode-metal-containing layer (15) has a thickness of 0.1 to 10 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain thickness of positive-electrode-metal-containing layer, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir.

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1996).

Re. claim 3, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Onomura further discloses wherein the positive-electrode-metal-containing layer (15) contains at least one metal selected from the group consisting of Pt at a concentration of 0.01 to 30 at. % with respect to the total amount of metal atoms contained in the positive-electrode-metal-containing layer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to implant dopant atoms between about 0.01 to 30 at. % with respect to the total amount of metal atoms, in order to reduce the resistivity of the device.

Generally, differences in concentration do not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989), and *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

Re. claim 4, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Onomura further discloses wherein the positive electrode includes a reflecting layer (12) on the contact metal layer (10), the reflecting layer comprising at least one metal selected from the group consisting of Pt.

Re. claim 5, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 4, wherein the reflecting layer (12) has a columnar crystal structure.

Onomura teaches the reflecting layer (12) has the same material as claimed invention, therefore it is obvious to has a columnar crystal structure in order to achieve the property of the device.

Re. claim 6, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 4, Onomura further discloses wherein the contact metal layer (10) has a thickness of 1 to 30 nm (Col. 6, lines 34-36 discloses the contact metal layer (10) has a thickness of 5 nm).

Re. claim 9, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Takatani further discloses wherein the semiconductor-metal-containing layer (the interface between 102_PtGa and

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101_GaN) further contains a nitrogen atom (as seen in Fig. 1).

Re. claim 7, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 4, wherein the reflecting layer has a thickness of 30 to 500 nm.

Col. 6, lines 34-36 of Onomura discloses the contact metal layer (10) has a thickness of 10 nm.

Onomura and Takatani may not explicitly teach the reflecting layer has a thickness of 30 to 500 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain thickness of the reflecting layer, since it has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

Re. claim 10, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Onomura and Takatani may not explicitly teach wherein the semiconductor-metal-containing layer has a thickness of 0.1 to 3 nm.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide certain thickness of the semiconductor-metal-containing layer, since it has been held that discovering the optimum or workable ranges involves

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only routine skill in the art. *In re Aller*, 105 USPQ 233; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Huang*, 100 F.3d 135, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996).

Re. claim 11, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the semiconductor-metal-containing layer contains a Group III metal (PtGa)

Onomura and Takatani may not explicitly teach the semiconductor-metal-containing layer contains a Group III metal at a concentration of 0.1 to 50 at. % with respect to the total amount of metal atoms contained in the semiconductor-metal-containing layer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to implant dopant atoms between 0.1 to 50 at. % with respect to the total amount of metal atoms, in order to reduce the resistivity of the device.

Generally, differences in concentration do not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235 (CCPA 1955). See also *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). For more recent cases applying this principle, see *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804,

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10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989), and *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990).

Re. claim 12, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, Onomura further discloses wherein the contact metal layer (10) comprises Pt.

Re. claim 13, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 12, Onomura and Takatani may not explicitly teach wherein the contact metal layer has a Pt(222) plane spacing of 1.130 .ANG. or less.

However, it would have been obvious to one of ordinary skill in the art the time the invention was made to provide the contact metal layer has a Pt(222) plane spacing of 1.130 .ANG. or less to improve crystal defect.

Re. claim 14, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 1, wherein the contact metal layer is formed through RF discharge sputtering (See Note 1).

Re. claim 15, Onomura and Takatani disclose the gallium nitride compound semiconductor light-emitting device according to claim 4, wherein the contact metal

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layer is formed through RF discharge sputtering, and the reflecting layer is formed through DC discharge sputtering (See Note 1).

Note 1: Claims 14 and 15 are drawn to a process by which the product is made. Even though product by process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. Because the product by process does not change the end product, Applicant's claimed invention does not distinguish over prior art. See MPEP § 2113.

Response to Arguments

Applicant's arguments with respect to claims above have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRANG Q. TRAN whose telephone number is (571)270-3259. The examiner can normally be reached on Mon - Thu (9am-5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. Q. T./

Examiner, Art Unit 2811

/Cuong Q Nguyen/

Primary Examiner, Art Unit 2811